DRAFT Procedures for determining the appropriate expression of the Highest Attainable Condition under the Willamette Basin Variance

After determining that a variance is needed and appropriate, the next step is to determine the requirements of the variance. The variance must include requirements to achieve the highest attainable condition during the term of the variance. The HAC may be expressed using one of three options provided in the federal regulations[1]. HAC option 1 is an alternative water body criterion. HAC options 2 and 3 express the highest achievable effluent condition and replace the water quality criterion as the target for the permit limit for the term of the variance. Although the term of the variance can be longer than five years, federal regulations specify that the HAC must be reevaluated at least every five years.

HAC option 2 is "the interim effluent condition that reflects the greatest pollutant reduction achievable." HAC option 3 is "if no additional feasible pollutant control technology can be identified, the interim criterion or interim effluent condition that reflects the greatest pollutant reduction achievable with the pollutant control technologies installed at the time the state adopts the WQS variance and the adoption and implementation of a Pollutant Minimization Plan.[2]" Neither option shall result in a lowering of the currently attained water quality.

The Federal Register for the proposed federal variance rule notes that the requirement to identify the HAC and to periodically re-evaluate the HAC ensures that there will be feasible progress towards attaining the designated use[3]. The federal register further explains that establishing interim requirements allows states to implement adaptive management approaches that drive progress towards meeting the designated use in a transparent and accountable manner.

DEQ determined that HAC option 1 ("the highest attainable interim condition") is not appropriate for the Willamette Mercury MDV. There is significant uncertainty about what concentrations of mercury can be attained in the Willamette Basin during the variance through point source controls, due to ongoing mercury deposition. Therefore, DEQ will express the HAC for each discharger using option 2 or 3, depending on whether there is feasible technology that would achieve significant reductions in the pollutant load for the facility as compared to current treatment. The flow chart (Figure 1) demonstrates the process that DEQ would use for determining the appropriate HAC option for each facility covered under the Willamette Basin Mercury MDV.

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[1] 40 CFR Part 131.14(b)(1)(ii)

[2] 40 CFR 131.14(b)(ii)(A)

[3] FR Vol. 78, No. 171, September 4, 2013, p.54534

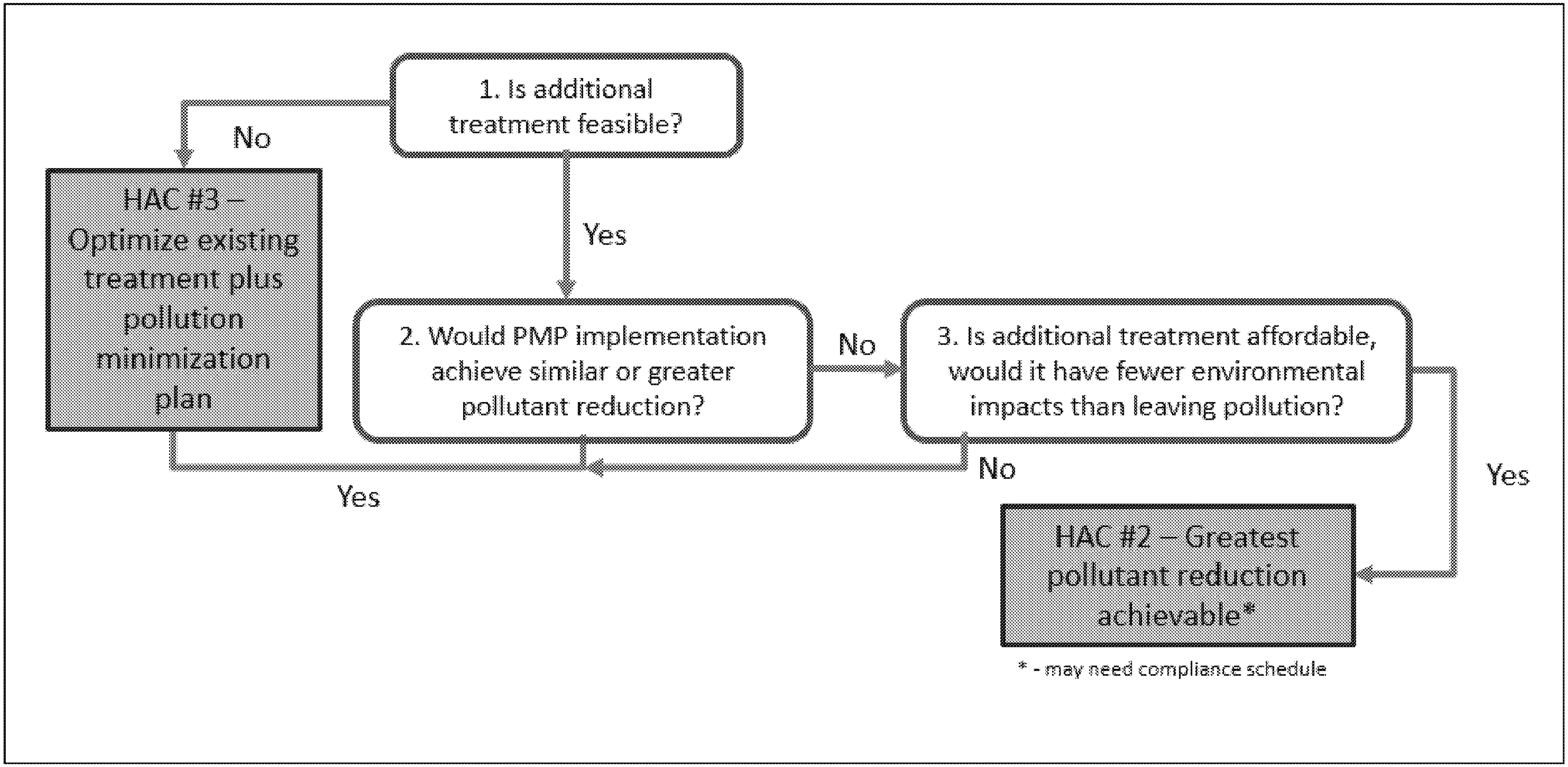


Figure 1. Highest Attainable Condition Determination Flow Chart

1. Is additional treatment feasible?

If there is no feasible technological upgrade that would significantly reduce mercury loads in a discharger's effluent, HAC option 3 would be appropriate. If technologically feasible upgrades are available (for example, if a wastewater treatment plant is utilizing secondary treatment and could reduce additional mercury by upgrading to advanced secondary or tertiary treatment), additional analysis would be needed to determine if similar or greater reduction could be obtained through implementation of a pollutant minimization program, or if such an upgrade is economically or environmentally feasible.

For wastewater treatment facilities, tertiary and advanced secondary treatment technologies result in the lowest concentration of mercury in effluent. Other treatment technologies, such as reverse osmosis or granular activated carbon, which might result in lower mercury concentrations, have not been proven to work at the scale of a municipal wastewater treatment system to DEQ's knowledge.

Data from Oregon and other states indicate that advanced secondary and tertiary technologies result in an average annual effluent concentration of 1-3 ng/l total mercury and remove approximately 96-98% of total mercury found in influent. Non-advanced secondary systems in Oregon operated by major facilities discharge effluent with average annual concentrations ranging from 1.2 – 8 ng/l and usually remove 90-98% of influent mercury.

If a municipal wastewater treatment facility has already installed advanced secondary or tertiary treatment, there are no feasible technological upgrades that can achieve greater mercury reduction at this time. For such facilities, HAC option 3 will apply. During re-evaluation of the variance, DEQ may require such facilities to conduct research to determine if feasible treatment upgrades have become available since the variance was granted.

However, if a treatment facility has a primary or secondary treatment system in place and data from the facility indicates that installing advanced treatment could significantly reduce their mercury loading, DEQ would perform additional evaluation to determine whether similar or greater mercury reduction could be achieved by implementing a mercury minimization program, as described in section 2 below.

2. Would PMP implementation result in similar or greater reductions than treatment?

In many cases, more mercury reduction can be achieved through MMP implementation and treatment optimization than could be done through major treatment upgrades at a lower financial and environmental cost. DEQ would work with the facility to compare mercury reductions that could be achieved through MMP implementation with that which could be achieved through treatment upgrades. If MMP implementation would be equally or more effective, HAC option 3 would apply. If greater source reduction could be achieved through treatment, DEQ would still examine if such treatment was affordable and environmentally feasible, as described in section 3 below.

DEQ analyzed a decade of mercury influent data from 72 major NPDES wastewater treatment plants Minnesota. Under the Great Lakes Initiative, these plants have implemented MMPs for at least a decade or more. These data indicate that MMPs have resulted in significant and continued reductions in mercury concentrations entering treatment systems. Between 2008 and 2017, influent total mercury concentrations decreased from an average of 180 ng/l to 70 ng/l (Figure 2).

In addition, data from the Rock Creek Advanced Wastewater Treatment Plant operated by Clean Water Services indicates decreasing mercury levels in biosolids, showing the effectiveness of their mercury reduction efforts over the last 20 years (Figure 3).

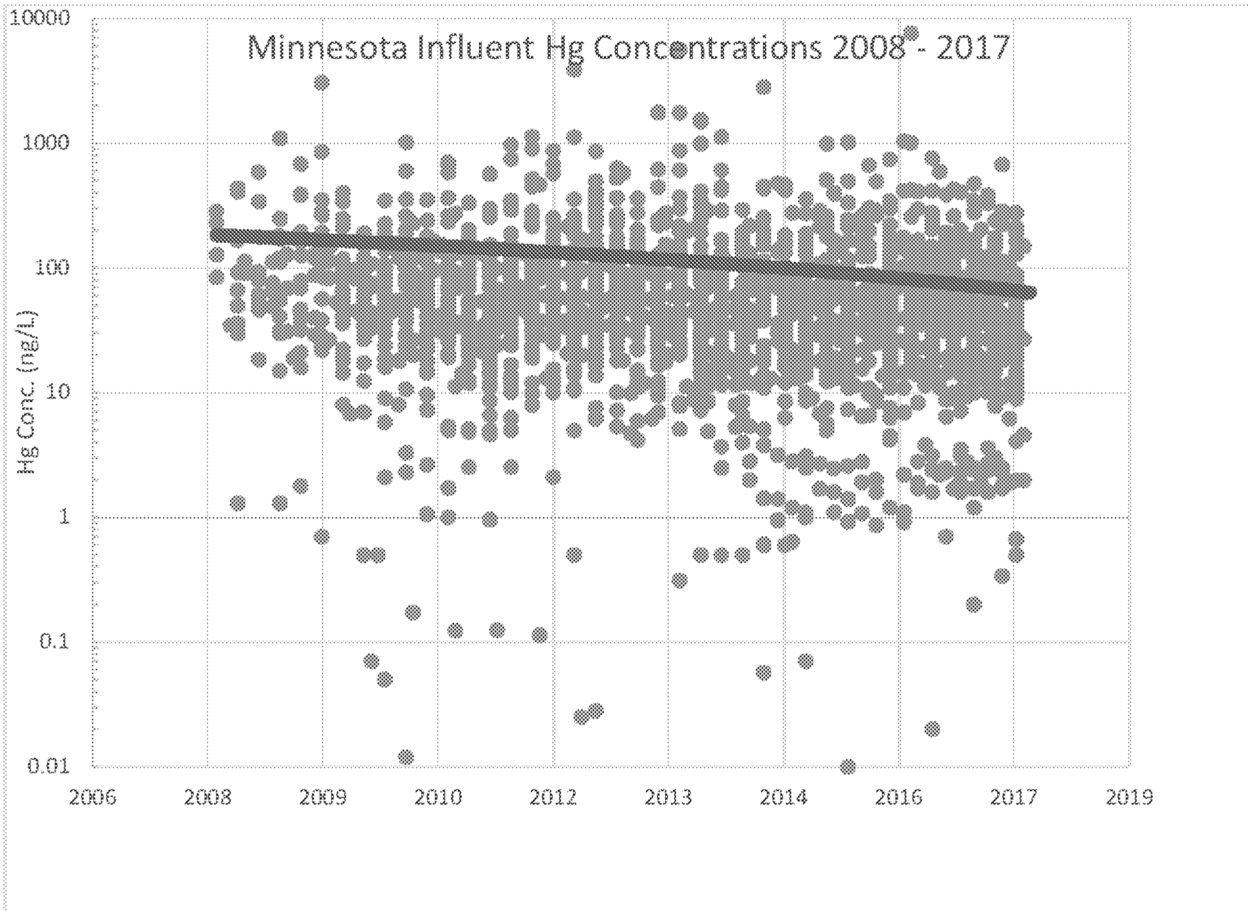
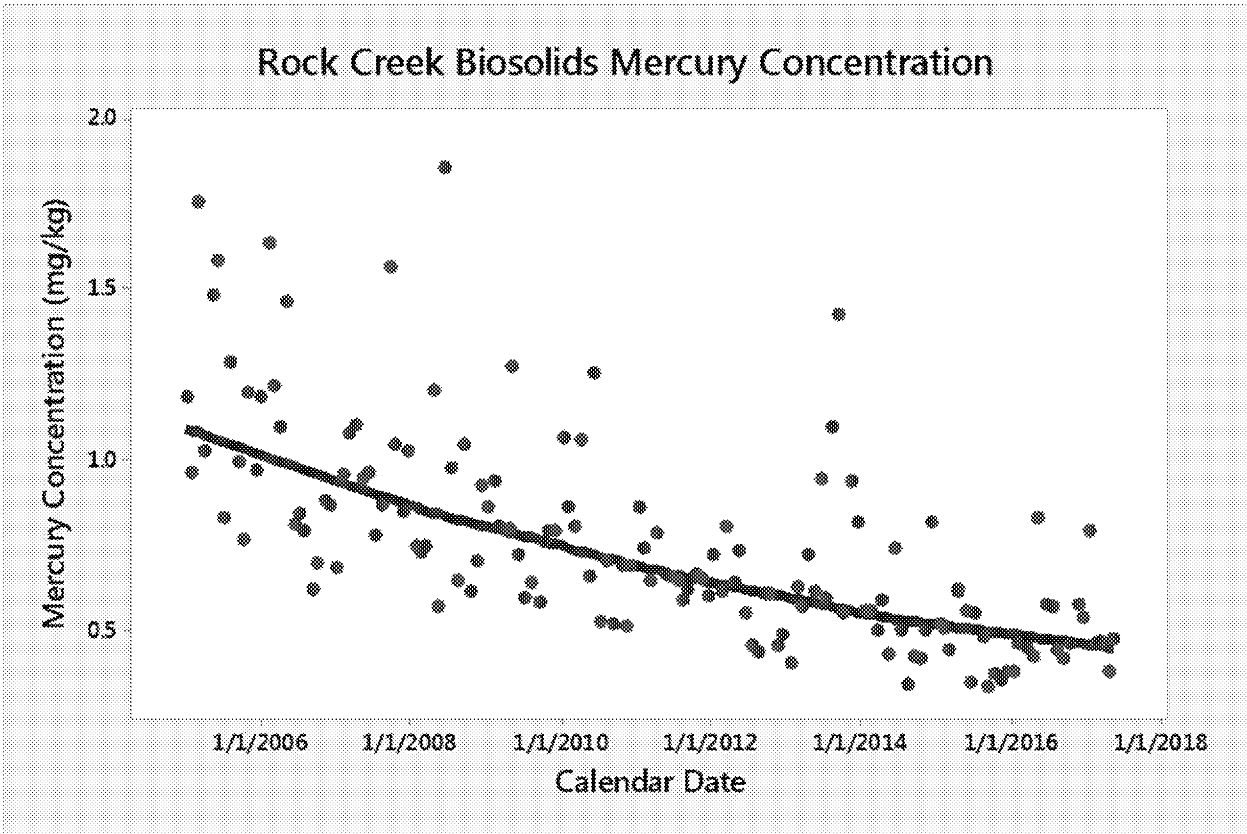


Figure 2. Influent Data from Major Wastewater Treatment Plants in Minnesota. Source: Minnesota Pollution Control Agency



Decreasing influent levels don't always result in similar decreases mercury levels in the treated effluent; however, both Minnesota facilities and Clean Water Services data indicate that effluent mercury levels have slowly decreased over time as well.

3. Is additional treatment environmentally or economically feasible?

If a treatment upgrade is likely to reduce mercury at a facility more than MMP implementation, DEQ would then examine the environmental and economic feasibility of installing upgrade.

Considerations would include:

- Economic cost of the upgrade with respect to median household income.
- Environmental costs of the upgrade.
- Amount of load reduction achieved with upgrades compared to economic and environmental costs of upgrades.

Determination of economic feasibility

For this question, DEQ will work the discharger to determine whether it is economically feasible to upgrade treatment to reduce mercury. EPA has developed draft guidance[4] on determining economic feasibility of treatment; however, it addresses a different question: whether treatment

[4] U.S. EPA Office of Water. 1995. Interim Economic Guidance for Water Quality Standards. EPA 823-B-95-002.

sufficient to meet the water quality standard would result in widespread and substantial economic harm. In this case, DEQ has already concluded that the criterion is not attainable in the water body due to human-caused sources of pollution which cannot be remedied. DEQ is currently in discussions with EPA to determine how best to answer the relevant question.

Determination of environmental feasibility

Justification factor 3 of federal rules state that variances can be justified if, "Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or *would cause more environmental damage to correct than to leave in place*." (Emphasis added) If a treatment upgrade is feasible, DEQ will then evaluate whether that treatment process would cause more environmental harm than "leaving the pollution in place," which in this case would mean achieving reductions through an MMP. For the MDV, additional treatment would, at most, likely reduce mercury by no more than a few nanograms per liter of effluent and likely would not result in a measurable change in water quality in the Willamette Basin, given the small portion that point sources contribute to the river. Thus, it's important to compare these reductions to potential environmental risks associated with upgrading treatment.

Environmental impacts of wastewater treatment can include additional energy consumption (and greenhouse gas emissions) and the need to dispose of additional waste. HDR estimated that upgrading a system from conventional secondary treatment to a membrane filtration and granulated active carbon facility would more than double daily energy demand; upgrading to a membrane filtration and reverse osmosis system would quadruple daily energy demand.[5] Upgrading from secondary to tertiary treatment can double energy consumption.[6] It also will increase generation of waste that would need to be land applied or disposed of in a landfill.

The Colorado Department of Public Health and the Environment has developed an "Other Consequences Test" to determine the environmental feasibility of pollution control alternatives for variances.[7] In their discussion of this test, they cite a finding by their commission that this test weighs and balances "the tradeoffs between the environmental damage caused by (in this case) exceedance of effluent limits with the environmental damage caused by meeting those effluent limits." In the case of the mercury MDV, DEQ would be looking at comparing the environmental damage of upgrading pollution control technology to the environmental damage of keeping and optimizing the current treatment technology and implementing a mercury minimization program. Their guidance requires that all relevant impacts to human health and the environment be considered, including:

- Predicted effluent concentrations for all constituents (both regulated and unregulated parameters may be considered);

[5] Treatment Technology Review and Assessment, Association of Washington Businesses, HDR, Dec. 2013.
[6] Kenway, S.J., A. Priestley, S. Cook, S. Seo, M. Inman, A. Gregory and M. Hall. 2008. Energy Use in the Provision and Consumption of Urban Water in Australia and New Zealand. Water Services Association of Australia.
[7] Colorado Water Quality Control Commission. 2013. "Policy 13-1, Interim Guidance for Implementation of Discharger Specific Variances Provisions, Regulation #31, Section 31.7(4)."

- Current practices for the facility's solid waste (e.g., agronomic beneficial use), and any expected changes based on the alternative;
- Increase or decrease in consumption of non-renewable resources;
- Increase or decrease in air emissions (e.g., toxics, NOx, SOx, greenhouse gases, particulate matter, odor);
- Changes in energy usage and/or energy recovery;
- Increased in-stream flows due to water conservation or decreased flows due to water consumption (e.g., evaporative losses) and associated impacts on downstream water users (e.g., need for augmentation plan);
- The effects on water supply for municipal, agricultural, and environmental purposes, including the environmental effects of transferring water out of agriculture;
- Changes in noise emissions;
- Impacts from manufacture, transport and use of chemicals (e.g., ferric chloride, alum, methanol, lime, polymer, chlorine);
- Construction phase impacts: cement, sand, steel, copper, PVC, pipes, pumps, motors, blowers, transport, etc.; and
- Ecological impacts of the proposed alternative (e.g., altered habitat, impacts to wildlife)."

DEQ is currently working with EPA to determine how best and efficiently to analyze whether additional treatment would cause more environmental harm than leaving the pollution in place.